

Determinants for Choice of Home Birth over Health Facility Birth among Women of Reproductive Age in Tanzania: An Analysis of Data from the 2015-16 Tanzania Demographic and Health Survey and Malaria Indicator Survey

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Abstract

Background: While evidence has shown an association between place of birth and birth outcomes, factors contributing to the choice of home birth have not been adequately investigated. In Tanzania more than 30% of deliveries occur out of health facilities with more than 95% of those deliveries are assisted by non-medical providers who are often unskilled. Birth assisted by unskilled birth attendants has been cited as a contributing factor for the high maternal and neonatal mortalities in low-resources countries. This study aimed at identifying determinants of choice for home birth over health facilities in Tanzania.

Method: This study used the 2015-16 Tanzania Demographic and Health Survey and Malaria Indicator Survey (2015-16 TDHS-MIS) dataset. A total of 2286 women of reproductive age (15-49 years) who gave birth within one year preceding the survey were included in the analysis. Both univariate and multivariable regression analyses were used to determine predictors for the choice of home-based childbirth over health facility.

Results: A total of 805 (35.2%) women had a home birth. After adjusting for confounders, the determinants for choice of home birth were the level of education [primary education, (AOR=0.666; p=0.001); secondary and higher education, (AOR=0.417; p<0.001)] in reference to no formal education; not owning a mobile phone, (AOR= 1.312; p=0.018); parity [parity 2-4, (AOR=1.594; p=0.004); parity 5 and above, (AOR=2.158; p<0.001)] in reference to parity 1; inadequate antenatal visits, (AOR=1.406; p=0.001); wealth index [poorest, (AOR=9.395; p<0.001); poorer, (AOR=7.701; p<0.001); middle, (AOR=5.961; p<0.001); richer, (AOR=2.557; p<0.001)] in reference to richest women and zones [Southern Highlands, (AOR=0.189; p<0.001); Southern, (AOR=0.225; p<0.001); Zanzibar, (AOR=2.55; p<0.001)] in reference to Western zone.

Conclusion: A large proportion of women birth at home. Unskilled providers such as traditional birth attendants (TBAs), relatives or friends attend most of them. Predictors for home-based childbirth were lack of formal education, poor access to communication, poor uptake of antenatal visits, low socio-economic status, and geographical zone. Innovative strategies targeting these groups are needed to increase the use of health facilities for childbirth, thereby reducing maternal and neonatal mortality in Tanzania.

Background

Maternal mortality remains a public health problem worldwide. In 2015, maternal mortality was the second leading cause of mortality among women of reproductive age worldwide [1]. Ninety four percent of these deaths occurred in developing countries, of which African countries accounted for 65% [1]. Tanzania has a high burden of maternal mortality with an estimated maternal mortality ratio of 546 deaths per 100,000 live births [2]. Most of these deaths are preventable if women receive appropriate antenatal and intrapartum care by skilled attendants [3]. Direct causes of maternal mortality contribute to up to 80% of all maternal deaths. These include severe bleeding usually after childbirth (postpartum hemorrhage), high blood pressure during pregnancy and the postpartum period (preeclampsia and eclampsia), and infection usually after childbirth or complications of abortion [1].

A retrospective study undertaken in Tanzania covering a period of 10 years from 2006 to 2015. found that the leading cause of maternal mortality was eclampsia (34.0%), followed by obstetric haemorrhage (24.6%) and maternal sepsis (16.7%). The main indirect causes of maternal mortality were anemia (14.9%) and cardiovascular disorders (14.0%). The study also reported that there was an increasing trend of maternal deaths due to haemorrhage and cardiovascular disorders during the period [4]. Likewise, neonatal mortality rate in Tanzania was estimated at 25 deaths per 1000 live births [2].

The risk of a woman to die from maternal causes in developing countries is high compared to developed countries (1 maternal death for every 41 live births compared to 1 maternal death for every 3,300 live births respectively) [1]. A collective effort is needed to reduce the gap between the global north and the global south. Learning from developed countries is a cornerstone strategy towards decreasing the risk of maternal and neonatal mortalities in the developing countries. One of the strategies used by the developed countries is the use of skilled attendants to assist women during labour and childbirth. Almost all births in these regions are assisted by skilled birth attendants regardless of the place of birth [1]. In Tanzania, more than 30% of all births occur out of health facilities, and 96% of those births are assisted by unskilled providers such as traditional birth attendants (TBAs) or relatives or friends [2]. These birth attendants often lack the necessary skills to identify signs of complications. In most cases, there is a delay on referrals to the facilities resulting to morbidity and mortality among mothers and newborns [5].

Skilled birth attendance is defined as the process by which a delivering woman is provided with satisfactory care during labour, delivery and the early postpartum period by a trained health care provider [6]. Although the use of skilled birth attendants have shown to be an effective strategy towards the reduction of maternal and neonatal mortality, still a number of women in Tanzania end up birthing at home, where they hardly get assistance from skilled birth attendants. These birth attendants in Tanzania play an important role in reduction of maternal and neonatal mortality through maternal and neonatal health counseling and escorting woman in labor to health facility for skilled birth [7,8]. Based on local regulations, TBAs in Tanzania are not officially allowed to assist birth. However, they are allowed to provide maternal reproductive health counselling and escorting a woman to a health facility [7,8]. Unlike developed countries, Tanzania lacks trained birth attendants who can assist delivery outside health facilities. Hence, most births occurring outside the health facilities are assisted by unskilled providers. In this study, home birth refers to all births which occur outside health facilities including but not limited to births at home and TBA clinics.

The World Health Organization (WHO) has reported several factors that may hinder pregnant women from accessing skilled antenatal and intrapartum care. These include; poverty, distance to a health facility, lack of information of where to access services, inadequate services and cultural practices [1].

Previous studies undertaken in rural Tanzania have also reported socio-cultural factors as one of the main determinants of maternal preference regarding place of birth [9]. For example, a socio-cultural tradition in some of the tribal cultures in Tanzania requires that when a married woman becomes pregnant for the first time, she has to go back to her parent's home and the decisions of where to deliver rest on her mother [10].

Home delivery is a risk factor for the health of both a mother and a newborn [7]. In the effort of promoting hospital delivery, the government of Tanzania has established a program of building one health facility per village to address the challenge of walking distance to a nearby health facility [11]. The government of Tanzania has also removed the financial barriers to maternity services by removing out of pocket cost-sharing for delivering services [12]. It is stated in the health policy that all direct costs associated with pregnancy care and childbirth are to be covered by the government. The ultimate goal here is to remove financial barriers to accessing maternal health care services. On top of that, there are community campaigns by both government and non-governmental organizations to encourage utilization of health facility for delivery [13].

Despite all these efforts, there is a large proportion of women in Tanzania and other developing countries who choose to give birth at home over health facility. This study was conceptualized to explore the determinants of choice of home childbirth over health facility childbirth among women of reproductive age in Tanzania.

Methods

Study design and data

This study is a cross-sectional analysis of a dataset from the 2015-16 Tanzania Demographic and Health Survey and Malaria Indicator Survey (2015-16 TDHS-MIS).

The 2015-16 TDHS-MIS

The 2015-16 TDHS-MIS is the ninth in a series of national sample surveys conducted in Tanzania to measure levels, patterns, and trends in demographic and health indicators [2]. The survey was undertaken by the National Bureau of Statistics (NBS) and the Office of Chief Government Statistician (OCGS), Zanzibar, in collaboration with the Ministry of Health, Community Development, Gender, Elderly, and Children on the Tanzania Mainland and the Ministry of Health, Zanzibar. The primary objective of the 2015-16 TDHS-MIS was to provide up-to-date estimates of basic demographic and health indicators. The survey collected information on fertility levels, marriage, sexual activity, fertility preferences, awareness and use of family planning methods, breastfeeding practices, nutrition, childhood and maternal mortality, maternal and child health, malaria, and other health-related issues.

The sample design for the 2015-16 TDHS-MIS was done in two stages and was intended to provide estimates for the entire country, for urban and rural areas in Tanzania Mainland, and for Zanzibar. The first stage involved selecting sample points (clusters), consisting of enumeration areas (EAs) delineated for the 2012 Tanzania Population and Housing Census. A total of 608 clusters were selected. In the second stage, a systematic selection of households was involved. A complete households listing was carried out for all 608 selected clusters prior to the fieldwork. From the list, 22 households were then systematically selected from each cluster, yielding a representative probability sample of 13,360 households for the 2015-16 TDHS-MIS. All women age 15-49 who were either usual residents or visitors in the household on the night before the survey were included in the 2015-16 TDHS-MIS and were eligible to be interviewed. Out of a total of 13,360 households selected for the 2015-16 TDHS, 12,767 were occupied. Of the occupied households, 12,563 were successfully interviewed, yielding a response rate of 98%. In the interviewed households, 13,634 eligible women were identified for individual interviews; interviews were completed with 13,266 women, yielding a response rate of 97%.

Four questionnaires based on the DHS program's standard were used for the 2015-16 TDHS-MIS: The Household Questionnaire, the Woman's Questionnaire, the Man's Questionnaire, and the Biomarker Questionnaire. In particular, the Woman's Questionnaire was used to collect information from all eligible women age 15-49. The information collected includes background characteristics, birth history and childhood mortality, knowledge and use of family planning methods, fertility preferences, antenatal, delivery, and postnatal care, breastfeeding and infant feeding practices, vaccinations and childhood illnesses, marriage and sexual activity, women's work and husbands' background characteristics, adult mortality, including maternal mortality, malaria, domestic violence, and other health issues

Study population and data extraction

For the present analysis, a subset of the original TDHS-MIS dataset was abstracted using the following criteria: women of reproductive age (15-49 years) who gave birth within the year preceding the survey. The individual recodes (TZIR7BFL) file was used. The final sample size for this analysis resulted into 2,286 women. We then dropped unnecessary variables to this study from the data file.

Study variables

Through a literature review, the conceptual framework was developed to guide the review. The conceptual framework had primary independent variables (socio-demographic and obstetric characteristics of a woman); the intermediate

variable which was the antenatal services utilization (coded 1 for adequate antenatal services utilization [four or more antenatal care visits] and 0 for inadequate antenatal services utilization [less than four antenatal care visits]); and the original outcome variable which was place of delivery and later dichotomized into a dummy variable coded as 1 if a woman delivered at home (out of health facility such as home or TBA premises) and 0 if a woman delivered at health facility.

Data analysis

Data were analyzed using Statistical Package for Social Sciences (IBM SPSS version 20). Data analysis started by describing all study variables using frequencies and percentages, we then assessed the association between a dependent variable and independent variables using the chi-squared test, and finally, we performed binary logistic regression analysis (univariate and multivariable) to determine significant predictors of the choice of home childbirth over facility childbirth. All analyses were based at a 5% level of significance.

Results

Socio-demographic characteristics

The majority of women 1,549 (67.8%) were between 20-34 years old, resided in rural Tanzania 1767 (77.3%), had completed a primary level of education 1,357 (59.4%), had completed inadequate antenatal visits 1262 (55.2%), and were married 2003 (87.6%) (Table 1).

Place of birth

The majority of study respondents 1,481 (64.8%) had a health facility birth while 805 (35.2%) of women had home birth.

Relationship between socio-demographic and obstetric characteristics with choice of place of childbirth

The following socio-demographic characteristics had a significant relationship with the choice of place of childbirth: place of residence, $p < 0.001$; age group, $p = 0.005$; education level $p < 0.001$; current marital status, $p = 0.001$; geographical zone $p < 0.001$; work status, $p = 0.033$, wealth index $p < 0.001$ and ownership of mobile phone, $p < 0.001$. The obstetric characteristic which showed significant relationship were number of antenatal visits, $p < 0.001$ and parity $p < 0.001$ (Table 2)

Determinants for choice of home birth over health facility birth

After adjusting for confounders, the determinants of home birth were the level of education [primary education, (AOR=0.666, $p = 0.001$; secondary and higher education, (AOR=0.417, $p < 0.001$)]; not owning mobile phone, (AOR=1.312, $p = 0.018$); parity [para 2-4, (AOR=1.594, $p = 0.004$), para 5 and above, (AOR=2.158, $p < 0.001$)]; inadequate antenatal visits, (AOR=1.406, $p = 0.001$); wealth index [poorest, (AOR=9.395, $p < 0.001$); poorer, (AOR=7.701, $p < 0.001$); middle, (AOR=5.961, $p < 0.001$); richer, (AOR=2.557, $p < 0.001$) and geographical zone [Southern Highlands, (AOR=0.189, $p < 0.001$); Southern, (AOR=0.225, $p < 0.001$); Zanzibar, (AOR=2.55, $p < 0.001$)] (Table 3).

Discussion

This study was conducted to provide information on determinants of choice of home childbirth over health facility childbirth among women of reproductive age in Tanzania. Women who choose home birth may have an increased risk of maternal and neonatal morbidity and mortality. The government of Tanzania has invested on promoting the

utilization of health facilities for childbirths as one of the strategies to decrease maternal and neonatal morbidity and mortality. Removal of financial barriers, increasing number of health facilities and increasing skilled human resources for health care are among the strategies that have been employed by the government to promote the utilization of health facilities for birth [14]. With all these efforts, one wonders why pregnant women still deliver at home where there is a very low possibility of being assisted by skilled birth attendants. This study used national survey data in order to provide a general picture on determinants of choice of home childbirth over health facility childbirth among women of reproductive age in the country.

This study revealed education level of a woman, parity, ownership of mobile phone, number of antenatal visits and geographic zone as the determinants of choice for place of childbirth among women of reproductive age in Tanzania.

The findings show that the odds of a pregnant woman having home birth over health facility birth decreases as a woman's education level increases. Pregnant women with primary education and at least secondary level were 33% and 58% respectively, less likely to choose home for childbirth over health facility when compared to women with no formal education. The possible explanation could be, advancement in education level increases exposure to health information as well as income. Some studies based on population surveys in Ethiopia had reported similar findings [15,16].

This study also revealed that pregnant women who had higher parity were more likely to choose home childbirth over health facility childbirth. Pregnant women who had two to four children were 1.5 times and those who had five or more children were 2.2 times more likely to have a homebirth compared to primiparous women. Similar findings have been reported by a study in Ethiopia [15]. One of the possible reasons could be history of uneventful birth which occur outside health facility lower their risk perception towards childbirth [7]. Women who had several births at home without complications may be more likely to choose the same attendants.

Pregnant women who did not own mobile phones were more likely to choose home over health facility for childbirth than those owning mobile phones. A possible explanation for this could be many women who own mobile phones are at a better chance of accessing reproductive health information through their mobile devices compared to those who have no access to phones.

The study showed that there was a significant relationship between wealth index status and choice of place of delivery. women of low economic status were more likely to choose home for childbirth. Even though the government of Tanzania has removed out of pocket payment for childbirth services, there are other many costs associated with health facility childbirth. For example, transport costs to the health facility which may be a challenge and contribute to home birth. There are also costs for birth items requested by health care providers. If a pregnant woman is not capable to get some or all of the items needed for childbirth, she may decide to opt for home childbirth to avoid embarrassment in the health facility. Some studies done in low resources countries have also reported income factors as one of the predictors of woman's choice of place of childbirth. [17,18].

The study also revealed that number of antenatal visits predicted the choice of place of delivery. Pregnant women who had inadequate antenatal visits were 1.4 times more likely to opt for home birth than those who had adequate antenatal visits. Despite the fact that majority of pregnant women in the survey had at least one antenatal visit, only 44.7% had the recommended four or more antenatal visits. Similar findings have been reported by some studies done in Ethiopia [14] and Kenya [17]. Perhaps women with inadequate antenatal visits are more likely to miss reproductive health education such as information on the obstetric danger signs. This may Decrease their likelihood to choose health facility for childbirth.

Geographic zones were used as a variable in determining choice for place of childbirth in order to ascertain the differences in use of home birth among them. Zones in Tanzania differ in their geographical locations and are used by national survey to facilitate data collection. The findings from this study show that women in Southern, Southern highlands and Eastern zones were less likely to choose home over health facility for childbirth when compared to women from Western zone. Moreover, women in Zanzibar had higher odds to choose home over health facility for childbirth when compared to pregnant women from the Western zone. These findings stimulate further studies to explore cultural, environmental and other factors, which could explain better those differentials in the choice of place of childbirth across different zones of Tanzania.

This study recommends innovative strategies to address the challenge of home birth such as lack of assistance from skilled birth attendants. In order to increase the utilization of health facilities for childbirth, we recommend a collective effort such as community sensitization on maternal services utilization.

Some studies in Tanzania have revealed that there is no collective decision among the households on choosing place of childbirth [9,19]. Gender division of roles and responsibilities influences the decision-making processes on the choice of place of childbirth. In most cases, men are not responsible in decision making for the choice of place of childbirth [9]. Men in Tanzania, similar to other developing countries, have dominative power and control over the family economy [20]. Thus, involving men in decision making for the birth preparedness and choice of place of childbirth is a cornerstone towards increasing utilization of health facilities for childbirth in Tanzania.

This study was limited to the use of secondary sources of data only, hence no in-depth information for exploring participants' perceptions and experiences regarding the place of delivery they used. However, the sample size was large enough to generate adequate power, and data collection was done by an experienced organization. Further studies should try to explore in-depth the reasons for the home childbirth among women of reproductive age in Tanzania.

Conclusions

There are large proportions of women in Tanzania that continue to deliver out of a hospital or facility setting. Most are assisted by non-medical birth attendants who may be unskilled, including traditional birth attendants (TBA), relatives and friends. Predictors for home-based childbirth were illiterate women, not owning mobile phone, inadequate antenatal visits, low socio-economic status and geographical zones. Based on the findings, authors recommend the following: First, programmes should be designed to provide education and create awareness on the importance of delivering at health facilities and the risks associated with delivering at home/out of health facility. Secondly, innovative interventions targeting women of reproductive age are needed in order to increase the use of health facilities for childbirth, which will eventually help to reduce maternal and neonatal mortalities in Tanzania. Thirdly, maternal health services at all levels of health facilities including dispensaries and health centres should be improved and be friendly to users. This will motivate women, particularly those of low socioeconomic status to utilize health facilities for delivery. Findings from this study might be useful in informing policy makers and public health experts on the maternal health areas requiring immediate intervention.

Declarations

Ethics approval and consent to participate

This study only makes use of secondary data without involving any human subjects. Therefore, no formal ethical approval was required. However, the request to use the data was sought from DHS measures. The permission was

given subject to using the data for this particular research topic only and publishing the findings in a peer-reviewed journal. ***Consent for publication***

Not applicable

Availability of data and material

The data that support this analysis are available at <https://dhsprogram.com/data/> subject to permission from MEASURE DHS.

Competing interests

Authors declare that there is no competing interest.

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Authors' contributions

FVM did data analysis, drafted the manuscript and led the process of critical revision of the manuscript. CHM developed the design section of the manuscript, data extraction and critical review of the manuscript. All authors read and consent for the manuscript to be submitted for peer review.

Abbreviations

AOR	Adjusted Odds Ratio
DHS	Demographic Health Survey
MoHCDEC	Ministry of Health, Community Development, Gender, Elderly and Children
NBS	National Bureau of Statistics
TBA	Traditional Birth Attendant
TDHS-MIS	Tanzania Demographic and Health Survey and Malaria Indicator Survey
USAID	United States Agency for International Development
WHO	World Health Organization

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Tables

Table 1: Socio-demographic characteristics of study respondents

Variable	Frequency	Percentage
Age groups(years)		
15-19	324	14.2
20-34	1549	67.8
35-49	413	18.1
Place of residence		
Urban	519	22.7
Rural	1767	77.3
Level of education		
No formal education	454	19.9
Primary education	1357	59.4
Secondary+	475	20.8
Wealth index		
Poorest	555	24.3
Poorer	476	20.8
Middle	405	17.7
Richer	477	20.9
Richest	373	16.3
Number of antenatal visits during pregnancy		
0-3	1262	55.2
4+	1021	44.7
Parity		
Para One	589	25.8
Para 2-4	1015	44.4
Para 5+	682	29.8
Owns a mobile telephone		
No	1265	55.3
Yes	1021	44.7
Marital Status		
Never Married	186	8.1
Married	2003	87.6
Separated	97	4.2
Respondent currently working		
Not working	612	26.8
Working	1674	73.2
Zones		
Western	212	9.3
Northern	186	8.1
Central	233	10.2
Southern Highlands	145	6.3
Southern	69	3
South West Highlands	271	11.9
Lake	665	29.1
Eastern	180	7.9
Zanzibar	325	14.2

Table 2: The relationship between maternal services utilization during pregnancy and choice of place of childbirth

Variables	Health Facility n (%)	Home n (%)	X²	p-value
Place of residence				
Urban	448(86.3)	71(13.7)		
Rural	1033(58.5)	734(41.5)	136.479	<0.001
Age group				
15-19	227(70.1)	97(29.9)		
20-34	1011(65.3)	538(34.7)		
35-49	243(58.8)	170(41.2)	10.516	0.005
Educational level				
No education	201(44.3)	253(55.7)		
Primary education	882(65)	475(35)		
Secondary+	398(83.8)	77(16.2)	158.952	<0.001
Parity				
Para one	455(77.2)	134(22.8)		
Para 2-4	679(66.9)	336(33.1)		
Para 5+	347(50.9)	335(49.1)	99.897	<0.001
Owns a mobile telephone				
Not owning	696(55)	569(45)		
Owning	785(76.9)	236(23.1)	118.404	<0.001
Wealth index				
Poorest	256(46.1)	299(53.9)		
Poorer	250(52.5)	226(47.5)		
Middle	246(61)	158(39)		
Richer	380(79.7)	97(20.3)		
Richest	348(93.3)	25(6.7)	297.847	<0.001
Number of antenatal visits during pregnancy				
0-3	729(57.8)	533(42.2)		
4+	749(73.4)	271(26.6)	59.441	<0.001
Marital Status				
Never Married	146(78.5)	40(21.5)		
Married	1272(63.5)	731(36.5)		
Separated	63(64.9)	34(35.1)	16.764	<0.001
Respondent currently working				
Not working	418(68.3)	194(31.7)		
Working	1063(63.5)	611(36.5)	4.526	0.033
Zones				
Western	119(56.1)	93(43.9)		
Northern	134(72)	52(28)		
Central	147(63.1)	86(36.9)		
Southern Highlands	134(92.4)	11(7.6)		
Southern	60(87)	9(13)		
South West Highlands	168(62)	103(38)		
Lake	352(52.9)	313(47.1)		
Eastern	154(85.6)	26(14.4)		
Zanzibar	213(65.5)	112(34.5)	150.926	<0.001

Table 3: Determinants of choice for home over health facility childbirth

Variable	OR	95%CI		p-value	AOR	95%CI		p-value
		Lower	Upper			Lower	Upper	
Place of residence								
Rural(ref)	1				1			
Urban	0.223	0.171	0.291	<0.001	0.774	0.55	1.09	0.142
Age group								
15-19(ref)	1				1			
20-34	1.245	0.96	1.615	0.098	1.134	0.795	1.617	0.488
35-49	1.637	1.203	2.228	0.002	0.886	0.555	1.414	0.611
Level of educational								
No education(ref)	1				1			
Primary education	0.428	0.345	0.531	<0.001	0.666	0.523	0.85	0.001
Secondary+	0.154	0.113	0.209	<0.001	0.417	0.284	0.614	<0.001
Parity								
Para one	1				1			
Para 2-4	1.68	1.331	2.121	<0.001	1.594	1.158	2.193	0.004
Para 5+	3.278	2.568	4.185	<0.001	2.158	1.47	3.168	<0.001
Owns a mobile telephone								
No	2.719	2.265	3.265	<0.001	1.312	1.048	1.643	0.018
Yes	1				1			
Antenatal visits								
4+	1				1			
0-3	2.013	1.685	2.406	<0.001	1.406	1.146	1.724	0.001
Wealth index								
Poorest	16.258	10.483	25.214	<0.001	9.395	5.435	16.24	<0.001
Poorer	12.584	8.073	19.615	<0.001	7.701	4.48	13.24	<0.001
Middle	8.904	5.665	13.997	<0.001	5.961	3.5	10.15	<0.001
Richer	3.553	2.236	5.646	<0.001	2.557	1.555	4.206	<0.001
Richest	1				1			
Working status								
Not working (ref)	0.807	0.663	0.983	0.034	0.979	0.767	1.248	0.861
Working	1				1			
Marital Status								
Never Married	1				1			
Married	2.098	1.461	3.011	<0.001	0.696	0.351	1.379	0.299
Separated	1.97	1.143	3.395	0.015	0.721	0.387	1.344	0.303
Zone								
Western	1				1			
Northern	0.497	0.326	0.755	0.001	1.062	0.657	1.718	0.805
Central	0.749	0.512	1.095	0.135	1.001	0.656	1.529	0.994
Southern Highlands	0.105	0.054	0.206	<0.001	0.189	0.093	0.384	<0.001
Southern	0.192	0.091	0.407	<0.001	0.225	0.103	0.493	<0.001
South West Highlands	0.784	0.544	1.131	0.193	0.842	0.564	1.259	0.403
Lake	1.138	0.834	1.553	0.416	1.4	0.993	1.973	0.055
Eastern	0.216	0.132	0.355	<0.01	0.573	0.328	1.002	0.051
Zanzibar	0.673	0.472	0.959	0.029	2.55	1.601	4.061	<0.001

Supplementary Files

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